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Semipermeable boundaries and heterogeneities: Modeling by singularities

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Abstract

A semipermeable membrane (low permeability skin around a well) is modeled by a sink at the center of the well. The sink solution does not exist for thick or resistive skins. Seepage around a low permeability dam contour is modeled by a vortex. The curve, along which the third-type boundary condition holds, is reconstructed from the equation of the contour in polar coordinates. Flow around an impermeable dam in a porous medium containing a semiparabolic interface is studied analytically with the refraction condition, i.e., continuity of the head and normal flux along the interface between zones of contrasting permeability.

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